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10/673,375	09/30/2003	Anthony Dip	243476US6YA	4360
22850	7590	02/12/2008		
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER NGUYEN, TUAN H	
			ART UNIT	PAPER NUMBER
			2813	
			NOTIFICATION DATE	DELIVERY MODE
			02/12/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/673,375	Applicant(s) DIP ET AL.	
	Examiner TUAN H. NGUYEN	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5, 6, 12, 13, 16, 18-20, 23-47 and 49 is/are pending in the application.
- 4a) Of the above claim(s) 38-46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 6, 12, 13, 16, 18-20, 23-37, 47, 49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 24, 29, 47, 49 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The step of depositing a silicon-containing epitaxial film on the substrate using the process gas consists of HCD gas without the addition of halogen gas which is well-known for etching and removing silicon atoms deposited on non-silicon surface in the selective deposition process, and the result is little silicon deposited on the non-silicon surface at the same time with thick silicon deposited on the silicon surface. How could the process be considered as a selective deposition process when there is little silicon deposited on the non-silicon surface as is disclosed in the instant specification, page 12, paragraph [0042], lines 5-6?

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 24, 29, 47, 49 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear as to how could the silicon-containing film be considered as “selectively depositing” on the substrate when the substrate is of the same material.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 12, 16, 23, 24, 27, 31-33, 47, 49 are rejected under 35 U.S.C. 102(e) as being anticipated by Nagaoka et al. (US 2003/0113971).

Nagaoka et al., figs. 1-6 and related text in paragraphs [0015]-[0105] discloses the claimed method of depositing a silicon-containing film on a substrate including the steps of heating the substrate in a process chamber of a processing system ([0047]); exposing a process gas consists of HCD ([0019], [0049]) to the substrate; and depositing a silicon containing epitaxial film on the substrate using the process gas.

With respect to claim 2, paragraph [0048] discloses the substrate is exposed to inert gas.

With respect to claim 12, paragraph [0076] discloses the dopant gas used for forming phosphorus doped silicon film.

With respect to claims 16, 23, 24, 49, paragraph [0095] teaches the formation of silicon germanium film by further comprises exposing a germanium-containing gas to the substrate.

With respect to claim 27, paragraph [0077] teaches the film formation temperature of 600°C.

With respect to claims 31-33, paragraph [0097] teaches the film formation pressure of 40Pa or 0.3 Torr which is about 0.4 Torr.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5-6, 12, 13, 16, 18-20, 23-37, 47, 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vatus et al. (cited ref. US 2004/0175893) in view of Singh et al. (US 2007/0240632).

Regarding claim 1, Vatus et al discloses a method of depositing a silicon-containing film on a substrate, the method comprising: providing a substrate in a process chamber of a processing system (pg. 1, paragraphs 0009-0011); heating the substrate (pg.3, paragraph 0031); exposing a HCD process gas to the substrate (Figure

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4, reference 604); and depositing a silicon-containing epitaxial or silicon germanium film on the substrate using the HCD process gas (Figure 4, reference 606).

Regarding claim 2, Vatus et al discloses wherein the exposing comprises exposing an inert gas to the substrate (pg.6, paragraph 0063; Figure 7, reference 299).

Regarding claim 3, Vatus et al discloses wherein the exposing further comprises the step of flowing the HCD gas at a flow rate between about 5 sccm and about 1,000 sccm and the inert gas at a flow rate between about 5 seem and about 20,000 seem (pg.3, paragraph 0030).

Regarding claim 5, Vatus et al discloses wherein the exposing further comprises exposing H₂ to the substrate (pg.3, paragraph 0030).

Regarding claim 6, Vatus et al discloses wherein the exposing further comprises flowing a hydrogen-containing gas at a flow rate between about 5 seem and about 5,000 sccm (pg.3, paragraph 0029).

Regarding claims 12, 13, Vatus et al discloses wherein the dopant is selected from group consisting of PH₃, B₂H₆, BC₁₃, and AsH₃ (pg.3, paragraphs 0028-0030).

Regarding claim 16, Vatus et al discloses wherein the exposing further comprises exposing a germanium-containing gas to the substrate (pg.3, paragraph 0028).

Regarding claim 18, Vatus et al discloses the germanium-containing gas is GeH₄ (pg.3, paragraph 0030).

Regarding claim 19, Vatus et al discloses wherein the exposing further comprises exposing hydrogen gas and a germanium-containing gas to the substrate (pg.3, paragraphs 0028-0030).

Regarding claim 20, Vatus et al discloses wherein the exposing further comprises exposing H₂ and GeH₄ to the substrate (pg.3, paragraph 0030).

Regarding claim 23, Vatus et al discloses wherein the exposing comprises exposing a HCD process gas including HCD gas and a germanium-containing gas to the substrate; and the depositing comprises depositing a SiGe-containing epitaxial film on the substrate (pg.2, paragraph 0025).

Regarding claim 24, Vatus et al discloses wherein the depositing comprises selectively depositing a SiGe-containing epitaxial film on a silicon surface (pg.2, paragraph 0025).

Regarding claim 25, Vatus et al discloses wherein the depositing comprises depositing a SiGe-containing epitaxial film having a germanium content below about two atomic percent (pg.2, paragraph 0025).

Regarding claim 26, Vatus et al discloses wherein the depositing comprises depositing a SiGe-containing epitaxial film having a germanium content greater than about two atomic percent (pg.2, paragraph 0025).

Regarding claim 27, Vatus et al discloses wherein the heating comprises heating the substrate to between about 500°C and about 900°C (pg.3, paragraph 0031).

Regarding claim 28, Vatus et al discloses wherein the heating comprising heating the substrate to between about 700°C and about 900°C (pg.3, paragraph 0031).

Regarding claim 29, Vatus et al discloses wherein the heating comprises heating the substrate to a temperature of about 800°C and the depositing comprises selectively depositing an epitaxial silicon-containing or silicon germanium film on a silicon surface of the substrate (pg.3, paragraph 0031).

Regarding claim 30, Vatus et al discloses wherein the heating comprises heating the substrate to a temperature of about 700°C and the depositing comprises non-selectively depositing the silicon-containing or silicon germanium film on the substrate (pg. 1, paragraph 0009).

Regarding claims 31-33, Vatus et al discloses providing a process chamber pressure of about 0.4 Torr (pg.3, paragraph 0032).

Regarding claim 34, Vatus et al discloses pretreating the substrate prior to exposing a HCD process gas to the substrate (pg.3, paragraph 0031).

Regarding claim 35, Vatus et al discloses wherein the pretreating comprises exposing a H₂ gas to the substrate at a substrate temperature between about 500°C and about 1000°C (pg.2, paragraph 0027).

Regarding claim 36, Vatus et al discloses wherein the pretreating comprises exposing a H₂ gas to the substrate at a substrate temperature of about 900°C (pg.2, paragraph 0027).

Regarding claim 37, Vatus et al discloses a computer readable medium containing program instructions for execution on a processor, which when executed by the processor, cause a processing apparatus to perform the steps in the method recited in claim 1 (pg. 1, paragraph 0011).

Regarding claim 47, Vatus et al discloses a method of depositing a silicon-containing film on a substrate, the method comprising: providing a substrate in a process Chamber of a processing system (pg. 1, paragraph 0009); heating the substrate (pg. 1, paragraph 0009); exposing a HCD process gas to the substrate (pg.3, paragraph 0030); and depositing a silicon-containing epitaxial film on the substrate using the HCD process gas wherein the depositing comprises selectively depositing an epitaxial Si film on a crystalline Si substrate (pg. 1, paragraph 0005).

Regarding claim 49, Vatus et al discloses a method of depositing a silicon-containing film on a substrate, the method comprising: providing a substrate in a process chamber of a processing system (pg. 1, paragraph 0009); heating the substrate (pg. 1, paragraph 0009); exposing a HCD process gas to the substrate (pg.3, paragraph 0031); and depositing a silicon-containing epitaxial film on the substrate using the HCD process wherein the depositing comprises selectively depositing an epitaxial SiGe film on a crystalline Si substrate (pg.2, paragraph 0025).

Vatus et al. teaches the use of HCD gas and HCl gas may include (paragraph [0029]) for improving the selectivity of silicon depositions in forming a silicon-containing epitaxial film; Vatus fails to teach the use of process gas consists of HCD gas or HCD gas and at least one gas from the group consisting of a dopant gas, H₂, a germanium-containing gas, and an inert gas.

Singh et al., in a related art as disclosed in paragraphs [0038] teaches the processes to grow a silicon-containing epitaxial film without HCl gas. The HCl gas is used in selective deposition for removing silicon formed on the non-silicon surface

([0038]); however due to the hazardous and toxic nature of HCl gas ([0008]-[0009]), Singh discloses the formation of a silicon-containing film with the use of no etchant such as HCl is necessary in the process of selective depositing silicon containing epitaxial film on the substrate.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a processing gas consisting of HCD with no additional etchant gas as suggested by Singh et al. in Vatus et al. process for forming a silicon-containing epitaxial film since the use HCl gas in addition to silicon source could create hazardous and toxic conditions.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Response to Arguments

Applicant's arguments with respect to claims 1-3, 5-6, 12, 13, 16, 18-20, 23-37, 47, 49 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TUAN H. NGUYEN whose telephone number is (571)272-1694. The examiner can normally be reached on M-TH, 6:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TUAN H. NGUYEN/

Primary Examiner, Art Unit 2813

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